

REMARKS

In view of the preceding amendments and following remarks, reconsideration of the present application is respectfully requested.

Claims 1-6 were pending in the Application. All of Claims 1-6 were rejected under 35 USC 102(e) as being anticipated by Katsumata (US 6,826,016). Herein, Claims 1, 3, 5, and 6 are amended, and Claims 2 and 4 are canceled. No new matter is introduced by these amendments.

The claimed present invention reduces the number of wire bonds and total number of bonding steps needed in the flex circuits that connect the magneto-resistive (MR) read-write heads in a hard disk drive to the controller electronics. Such reduces the costs of manufacturing, and improves performance by reducing the parasitic inductances and capacitances on the interconnects. A single flex interconnect, instead of several, connects all the heads to the disk controller connector.

The Office Action says for "Claim 1, Katsumata shows a flex interconnection circuit in Figs. 3-8 on a substrate, including: a connector bonding site 53; an electronic component collection bonding site 52 (Figs. 7 and 8), at least one MR read-write head bonding site (the site near 26 in Fig. 3), the connector bonding site coupled to the electronic component collection bonding site; and the electronic component collection bonding site coupled to at least one MR read-write head bonding site; wherein the electronic component collection inherits [sic] at least one preamplifier (Column 1, lines 51-55)."

In fact, Katsumata teaches the very interconnect system that is the problem being solved by the present invention, e.g., in Fig. 4 there is shown how four flex traces 28 to each head are individually bonded to an actuator main flexible printed circuit (FPC) 32 at connection pads 66. The present invention eliminates all these bonds and connection pads so that all the heads are

directly connected through the pre-amplifier with one flex circuit to our connector 226 in Fig. 5 (Katsumata's connector 40 in his Fig. 2). So, Katsumata hardly anticipates nor makes the present invention obvious or unpatentable.

Katsumata reveals just how many connections and transitions are required by him in the two paragraphs at column 8, lines 13-33:

15 The group of the conductive lines 62 of the main FPC 32 includes eight independent signal lines connected to the connection pads 66 for signals X and Y of each set, a common power source line connected to any one of the connection pads 66 for Vcc, e.g., the lowermost connection pad, a common GND line connected to any one of the connection pads 66 for GND, e.g., the lowermost connection
20 pad, a common power source line connected to any one of the connection pads 66 for Vcc, e.g., the lowermost connection pad, and further two power source lines connected to the voice coil of the VCM 16.

25 Further, five electrode pads 58 provided at the connection end portion 53 of the trace 28 of each HSA 22 are soldered to the respective five connection pads 66 of a corresponding set of the connection end portions 32a of the main FPC 32. In this manner, each magnetic head 26 is electrically connected to the circuit board body 34 through the head IC 50,
30 the relay FPC 56 of the trace 28, and the main FPC 32, and this circuit board body 34 is electrically connected to the printed circuit board 15 through the connector 40.

A review of pending Claims 1-6 shows that such can be amended to more clearly and precisely distinguish over Katsumata. Therefore, Claims 2 and 4 are canceled, and Claims 1, 3, 5, and 6 are amended to limit to a single flex circuit for interconnection of two or more heads to the main electronics connector. Element numbers from our Figs. 1-8 are included herein to improve understanding of what exactly is being claimed, and also to show that any additions are not new matter.

Claims 1 and 3-6 were also rejected under 35 USC. 103(a) as being unpatentable over Ishida, et al., (US 5,859,746) in view of Rancour, et al., (US 7,002,780) and Takasugi (US 6,351,351).

The Office Action alleges for "Claim 1, Ishida et al shows a flex interconnection circuit in Figs. 6 and 7 on a substrate Fb (Column 5, lines 48-49), including: a connector bonding site (above

connector 32 in Fig. 7; column 7, line 12); an electronic component collection bonding site at marks 18a, lab, and 18c (Column 7, line 19), at least one MR read-write head connecting site 16 (Column 6, line 43), the connector bonding site coupled to an electronic component collection bonding site through P13 (column 6, lines 44-46); and the electronic component collection bonding site coupled to at least one MR read-write head connecting site through P11 (Column 6, lines 42-43)."

And, "Rancour et al shows a flex connection, wherein the MR read-write head on 12 is bonded to the flex at the bonding site 90 (Fig. 7)....Rancour further teaches that his configuration increases conductivity, improves static attitude control, and is more efficient for manufacturing (Column 2, lines 8-10)....One of ordinary skill in the art would have been motivated to use the head connecting site in Ishida et al's device as bonding site for bonding the MR read-write head thus increasing conductivity, improving static attitude control, and is more efficient for manufacturing."

And the third Reference, "Takasugi shows an interconnection circuit, wherein IC is a preamplifier (Column 7, line 9)....It is also well known in the art that preamplifier is commonly used in interconnection circuit on the suspension, which is also always an IC....One of ordinary skill in the art would have been reasonably expecting the IC in Ishida et al's device includes a preamplifier."

Each of these References, and any combination of them, miss the point of providing a single interconnecting flex circuit for all the heads, preamplifiers, and the connection to the controller. Claims 1-6, as originally presented, were apparently not clear enough, and so invoked this prior art.

Even so, the rejections are traversed for having not put forth an objective and realistic motivation for making the combinations alleged. The motivations for making the combinations stated by the Office are vague, general wishes, and benefits observed in hindsight. The are not real reasons an actual artisan in the field at the time would have seen to use each element together. The 35 USC 103 rejections therefore fail to make a prima facie case of obviousness.

As amended, Claims 1, 3, 5, and 6, steer clear of benefiting from anything the cited prior art may have taught. The objectives are different, and each of the References actually teach the

Accordingly, in view of the preceding amendments and remarks, it is respectfully submitted that the pending application, with pending Claims 1, 3, 5, and 6, is in condition for allowance and such action is respectfully requested.

CONCLUSION

Should the Examiner be of the opinion that a telephone conference with Applicant's attorney would expedite matters, the Examiner is invited to contact the undersigned below.

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Signature


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